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HEARING

BEFORE THE

SPECIAL COMMITTEE ON SPACE AND ASTRONAUTICS UNITED STATES SENATE

EIGHTY-FIFTH CONGRESS

SECOND SESSION

ON THE

NOMINATION OF T. KEITH GLENNAN TO BE ADMINISTRATOR, NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

AND THE

NOMINATION OF DR. HUGH L. DRYDEN TO BE DEPUTY ADMINISTRATOR, NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

AUGUST 14, 1958

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NOMINATION OF T. KEITH GLENNAN TO BE ADMINISTRATOR OF NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

THURSDAY, AUGUST 14, 1958

UNITED STATES SENATE,
SPECIAL COMMITTEE ON SPACE AND ASTRONAUTICS,
Washington, D. C.

The special committee met, pursuant to call, at 10:30 a. m., in room F–39, United States Capitol Building, Senator Lyndon B. Johnson (chairman) presiding.

Present: Senators Lyndon B. Johnson, Green, Anderson, Symington, Bridges, Hickenlooper, Saltonstall, and Bricker.

Also present: Mrs. Eilene Galloway, special consultant; Dr. Glen P. Wilson, technical coordinator; Gerald W. Siegel and George Reedy, professional staff members.

Senator JOHNSON. Will the committee please come to order?

This meeting has been called today to consider the nominations of Dr. T. Keith Glennan and Dr. Hugh L. Dryden as Administrator and Deputy Administrator, respectively, of the newly created Space Administration.

From every standpoint, these are two of the most important nominations made to this Congress. The President is proposing to lay a tremendous burden upon the shoulders of these gentlemen.

The difference between success and failure in their performance could be the difference between success and failure for this country. We start from behind in many respects. They will have the job of catching up.

I will first call Dr. Glennan to the stand.

Mr. Glennan, we have called this hearing today to determine whether you have the necessary qualifications to become the midwife for America's space age.

This committee has spent considerable time in an examination of the fantastic problems involved. We are aware of the complications and we do not envy the man who takes on this job.

If you are confirmed, I am not certain whether congratulations or commiserations will be in order.

This position is in no sence a sinecure. It calls for a man who has little interest in rewards but a passionate and positive addiction to work.

There are no blueprints or roadmaps which clearly mark out the course that the new space director must follow. The limits of the job are no less than the limits of the universe. And those are limits which can be stated but are virtually impossible to describe.

I think it is safe to say that any study of this subject will lead any man to a sense of humility and a realization of human limitations.

No mortal man could possibly possess all the qualifications for this job and we are not expecting that.

To be fully qualified, a man would have to be a repository of all human knowledge. He would have to be an expert in physics, astronomy, chemistry, and biology. At the same time, he would have to be a philosopher and a historian.

He would have to be possessed of cold practical judgment, touched with the fire of daring imagination. I suppose also that he would have to be a reflective man capable of working at top speed 24 hours a day.

We are not asking all that of you, Dr. Glennan. We are asking whether you can assemble the men who—all put together—will add up to what America needs.

In a sense, the new agency which you have been nominated to head can be compared to the voyage of Columbus to the New World. The only difference is that Columbus—with his charts drawn entirely from imagination—had a better idea of his destination than we can possibly have when we step into outer space.

We do know certain things:

We want outer space to be a highway to peace and prosperity and not a road to war. We seek a maximum development of all the potentialities and not just a narrow production of new weapons.

I should like to ask the committee's unanimous consent to place in the record at this point the background of Dr. Glennan, and then, Dr. Glennan, I should like for you to proceed with any statement that you may care to make in any manner in which you care to make it, and, at the conclusion of that statement, each member of the committee will be given an opportunity to ask you any questions that may occur to them.

Without objection, the biographical sketch will be inserted in the record.

(The biographical sketch is as follows:)

BIOGRAPHICAL SKETCH OF T. KEITH GLENNAN, PRESIDENT OF CASE INSTITUTE OF TECHNOLOGY

T. [for Thomas] Kieth Glennan, whose career has been marked by achievements in business, education, and the administration of scientific research, became the fourth president of Case Institute of Technology on September 1, 1947.

Born in Enderlin, N. Dak., on September 8, 1905, where his father was stationed as a train dispatcher, he spent most of his youth in Eau Claire, Wis., where he attended high school, worked at a variety of odd summer jobs and spent 2 years attending State teachers college. He entered Yale in 1924 where he worked his way through college, graduating from Sheffield Scientific School in 1927 with a degree in electrical engineering, cum laude.

Following graduation, he became associated with the then infant talking-motion-picture industry and spent 2 years in Europe supervising the installing of sound systems. Later, he became assistant general service superintendent for Electrical Research Products, a subsidiary of Western Electric. In 1935, he joined Paramount Pictures, Inc., in Hollywood, becoming studio manager in 1939. He served briefly as an executive with Vega Airplane Corp. in 1941, returning to the motion-picture industry as studio manager of Samuel Goldwyn Studios. He joined the Columbia University division of war research in 1942, serving through the war, first as Administrator, and then as Director of the United States Navy's Underwater Sound Laboratories at New London, Conn. For these services he was awarded the Medal for Merit.

At the end of the war, he became an executive of Ansco, in Binghamton, N. Y. From this position, he was called to the presidency of Case, which, in 1947, changed its name from Case School of Applied Science to Case Institute of Technology. During his presidency, he also served from October 1950 to October

1952, as a member of the Atomic Energy Commission, following an appointment by President Truman and confirmation by the Senate.

During Glennan's first 10 years at Case, important progress was made in increasing both the quality and qunatity of the faculty, student body, and physical plant. A major building program was initiated, the floorspace of the campus more than doubled, and important curricular changes emphasizing the role of the humanities in engineering education were initiated. During his 11-year administration, Case was transformed from a primarily local institution into one that Dr. Edward Teller recently ranked with the first 4 engineering schools in the Nation.

At the same time Glennan has been extremely active in both local and national affairs. Nationally, he is a member of the Board of the National Science Foundation. He is also chairman of the board of the Institute for Defense Analysis, and a member of the board of directors, Council on Financial Aid to Education, and a member of the General Advisory Committee of the AEC. Locally, he has served as chairman of the Metropolitan Services Commission of Cleveland, which has been concerned with improving government services in the Greater Cleveland area, and in the University Circle plan for the development of a multi-institutional $125 million cultural and educational center in Cleveland.

He is also a trustee of the Cleveland Clinic Foundation.

In the world of business, he is a member of the boards of the Cleveland Electric Illuminating Co., the Clevite Corp., Standard Oil (Ohio), and the Harris-Intertype Corp.

He has been awarded honorary degrees of doctor of science from Oberlin College, Clarkson College of Technology, and John Carroll University, and the doctor of engineering degree from Stevens Institute of Technology and Fenn College. He is a fellow of the American Academy of Arts and Sciences and a member of Sigma XI, Tau Beta Phi, and Chi Phi.

He is married to the former Ruth Haslup Adams, daughter of the later Dr. Thomas Sewell Adams, the eminent Yale professor and tax authority, for whom he served as a chauffeur while attending Yale. He has four children; the oldest, Thomas Keith Glennan, Jr., is pursuing graduate studies at MIT, Catherine recently graduated from Swarthmore; Pauline is about to graduate from high school, and Sarah from junior high school.

Senator JOHNSON. Dr. Glennan, will you proceed?

STATEMENT OF T. KEITH GLENNAN, PRESIDENT, CASE INSTITUTE OF TECHNOLOGY, CLEVELAND, OHIO

Dr. GLENNAN. Mr. Chairman, after listening to that charge, I think the part of wisdom would be to turn around and go home, but that isn't why I came here, and I would like the privilege of extemporizing a little bit about my background.

Others are better able to judge, perhaps, my ability to carry out the task that has been set.

My name is Thomas Keith Glennan. I was born in Enderlin, N. Dak., in 1905, September 8.

My father, who died in 1940, was a train dispatcher.

My mother, now 83, lives in Monrovia, Calif.

I was married in 1931 to Ruth Haslup Adams, the daughter of Prof. Thomas Sewell Adams, of Yale.

I have 4 children, a boy, Thomas, age 23 and married, and 3 daughters, Kitty, 21; Polly, 17; and Sally, 14.

I am a Protestant in religion, a Presbyterian.

In politics, I register as a Republican.

My education was in the public schools of Eau Claire, Wis., State Teachers College of Eau Claire, Wis., Yale University with a degree in electrical engineering, a bachelor of science in 1927, and I hold honorary doctorates from five institutions.

In work experience, I spent 8½ years with a subsidiary of the Western Electric Co. directly after finishing college, the Electrical

Research Products, Inc., and 2 of those years were spent in Europe. Then, 8 years in the motion-picture industry, where I was for 5 years studio manager at Paramount Studios, and for about a year and a half studio manager for Sam Goldwyn.

Then came the war, and 3 years as director of the United States Navy Underwater Sound Laboratories in New London, Conn., in undersea warfare, and for that activity I was awarded the Medal for Merit in 1946.

Two years, then, as executive in charge of administrative services and engineering at Ansco in Binghamton, N. Y.; and in 1947 and for the past 11 years, president of Case Institute of Technology in Cleveland, Ohio.

As you probably know, this is an institution specializing in science, engineering, and management.

In governmental services, as I look back, I have spent 2 years as a member of the Ordnance Panel of the RDB, 2 years as a Commissioner of the United States Atomic Energy Commission.

I am now and have been for 3 years a member of the National Science Board, and for 3 years a member of the General Advisory Committee to the Atomic Energy Commission.

I was a member of the McKinney Panel on Peaceful Uses of Atomic Energy, and a member of the Hayworth Committee on the Evaluation of the Combat Development Program of the Army.

In the field of public service, I presently am chairman of the Metropolitan Services Commission in Cleveland, Ohio, where we are conducting a rather broad research program into the problems of urban governmental organization. I am a trustee of the Cleveland Clinic Foundation, known for many years as the Trial Clinic; a director of the Council for Financial Aid to Education; a trustee of Case Institute of Technology; chairman of the board of the Institute for Defense Analyses; and a trustee under the will of a lady who died a year ago, Mary Merton.

I hold directorships in four industrial organizations—the Cleveland Electric Illuminating Co., a utility; Harris-Intertype Corp., one of the large companies in the graphic arts business; Clevite, Inc., active in automotive and electronics; and the Standard Oil Company of Ohio.

I propose to resign from all outside activities enumerated here and any that I have forgotten except the trusteeship at Case, a nonprofit educational institution, and the trusteeship under this will which I mentioned a moment before.

In order to clarify my mind and hopefully to satisfy the committee on the matter of possible conflict of interest, I had a discussion with the Assistant Attorney General, Mr. Wilkey, and I have here a statement which I presume might be inserted in the record, a summary of which I would like to read, if I may.

Senator JOHNSON. Proceed.

Dr. GLENNAN (reading):

You have requested my opinion upon the propriety—

this is addressed to Mr. Sherman Adams—

upon the propriety of the appointment of Mr. Keith Glennan as Administrator of the National Aeronautics and Space Administration. It is understood that Mr. Glennan will be on leave for his duties——

Senator JOHNSON (interposing). This is a memorandum requested by Governor Adams from the Justice Department?

Dr. GLENNAN. At my request; yes, sir.

Senator SALTONSTALL. Mr. Chairman, would the chairman yield?

Senator JOHNSON. Yes.

Senator SALTONSTALL. I was just going to ask the chairman: In our Armed Services Committee when we do this, we do it in executive session, if they are private and personal matters——

Dr. GLENNAN. It is.

Senator SALTONSTALL. Unless the doctor wants to give it in public session. And, as the Senator knows, since he is a member of that committee, we keep such material in the vault.

I was just wondering from Dr. Glennan's point of view whether he wants to give his private affairs in the public session. If he does, I have no question.

Senator JOHNSON. Has he got anything in there that he doesn't want to——

Dr. GLENNAN. I have no objection for the summary to be on the record. There is a listing of the very few securities I hold that I think is not a matter of——

Senator JOHNSON. What I don't have clear in my mind is: Who is this memorandum from and who is it to?

Dr. GLENNAN. This memorandum is from Mr. Malcolm R. Wilkey.

Senator JOHNSON. That is what I thought.

Dr. GLENNAN. The Assistant Attorney General. It was made at my request.

Senator JOHNSON. You requested Mr. Wilkey——

Dr. GLENNAN. I did not personally request Mr. Wilkey, because I did not know Mr. Wilkey at that time. I asked Mr. Adams if I could not have an evaluation of my situation by the Justice Department, so that I could be satisfied that I was not entering upon something without clear understanding on my part.

Senator JOHNSON. And Mr. Adams told you you could.

Dr. GLENNAN. That is right.

Senator JOHNSON. And Mr. Adams therefore requested Mr. Wilkey——

Dr. GLENNAN. He called Mr. Wilkey on the telephone——

Senator JOHNSON. To prepare the memo? Who gave him the facts upon which it was based?

Dr. GLENNAN. I did.

Senator JOHNSON. You went and saw him?

Dr. GLENNAN. Yes.

Senator JOHNSON. And you gave him the facts that helped him to prepare this memorandum, and you have no desire to keep it private?

Dr. GLENNAN. I have no desire particularly to keep it private. The conclusions are very simple.

Senator JOHNSON. Fine. Just proceed with the memorandum.

Dr. GLENNAN. I will read that portion of it which summarizes, if I may.

Senator JOHNSON. Go ahead.

Dr. GLENNAN (reading):

You have requested my opinion upon the propriety of the appointment of Mr Keith Glennan as Administrator of the National Aeronautics and Space Administration. It is understood that Mr. Glennan will be on leave from his duties as president of Case Institute, a private nonprofit educational institution. He will perform no presidential duties while serving as Administrator of the NASA.

However, it is anticipated that until approximately January 1, 1959, Mr. Glennan will return to Cleveland on weekends from time to time and will confer with the trustees and officials of Case Institute in regard to matters which are now pending in his administration. These would be matters which normally would be attended to by an individual terminating a responsible position.

Mr. Glennan also will continue as trustee of Case Institute and will perform the normal duties of trustee as time permits.

It is also understood that Mr. Glennan occupied a house owned by Case Institute in Cleveland. It is anticipated that Mrs. Glennan and his three daughters will continue to occupy the house until about February 1, 1959, because the daughters are in school, and it is desired that they complete their education where entered. Mrs. Glennan will join Mr. Glennan in Washington about February 1, and the daughters may remain in the house or take an apartment. The institute would not charge rent but would allow Mr. Glennan's family free occupancy in consideration of care of the house and grounds. The furnishings belong principally to Mr. Glennan. He would occupy the house only on weekend visits and would have no duties in relation to the house.

Mr. Glennan owns stock in a number of publicly held corporations. None of his holdings constitutes a majority or even a controlling interest. Mrs. Glennan also owns some securities. A list of their holdings is attached to this memorandum.

And the conclusion is:

It is my opinion that none of the foregoing facts constitute an impediment to the appointment of Mr. Glennan as Administrator of NASA. However, he should be advised, to disqualify himself from taking any action as Administrator with respect to any of the companies in which he is interested or with respect to Case Institute should agency action be required with respect to these organizations. In addition, as trustee of Case Institute, he should disqualify himself from participating in any matters pertaining to the relations of the institute with the Federal Government.

I will be glad, sir, to answer any further questions.

Senator JOHNSON. Doctor, you will insert in the record the entire memorandum?

Dr. GLENNAN. I want to insert this summary and I would propose to give to the committee, if they wish it, whatever backup material they want on this.

Senator JOHNSON. Fine. Did you read the complete memorandum?

Dr. GLENNAN. I read only the first three pages which are the summary of the memorandum, and that is what I propose to have in the public record, if that is satisfactory to you, sir.

Senator JOHNSON. And the rest you want in the private record?

Dr. GLENNAN. That is right, sir, because it simply enumerates these stock listings which you may look at if you wish.

Senator JOHNSON. Fine. Thank you, Doctor.

Doctor, I gather from what Mr. Wilkey said in his memorandum that you are going to divide your time between Washington and Cleveland.

Dr. GLENNAN. I am not going to divide my time between Washington and Cleveland, sir, in the ordinary sense of that word. As you might well understand, this has come upon me rather suddenly. An educational institution of the size of Case has some problems of administration and development these days. That, too, is a substantial job of public service and I think it important that I go back there perhaps as often as every other week end for 2 days, 3 days, the weekend, for consultation with the people who will carry on the task while I am away.

Senator JOHNSON. So do you propose to spend part of your time as Space Director and every 2 or 3 days out of every other week you spend at Case?

Dr. GLENNAN. That is one way of putting it, sir. I suspect it is.

Senator JOHNSON. Isn't that the correct way? I am trying to repeat what you said.

Dr. GLENNAN. I suggest to you that my full energies will be at the job of Space Director.

Senator JOHNSON. How can they be, spending 3 days every 2 weeks at Case?

Dr. GLENNAN. Well, sir, if I go back, I suppose that I have some right to the weekends, and, if I use the weekends in that way, I would think this would not be subject to question.

Senator JOHNSON. Have you given any attention to section 202 (c) of the Space Act which prohibits other employment?

Dr. GLENNAN. Yes, sir. I am not being paid for that employment, sir.

Senator JOHNSON. And you wouldn't consider it employment unless you had some dollars for it.

Dr. GLENNAN. That is essentially correct, sir.

Senator JOHNSON. And you have been given some rent.

Dr. GLENNAN. That is right.

Senator JOHNSON. What is the value of that rent?

Dr. GLENNAN. A couple of hundred a month, I suppose, sir.

Senator JOHNSON. How much?

Dr. GLENNAN. A couple of hundred dollars a month.

Senator JOHNSON. What is the difference between 200 silver dollars and $200 in rent?

Dr. GLENNAN. I suppose there isn't any, and if it is important to you, sir, I will pay the rent.

Senator JOHNSON. No. It is not important to me, but it is important to you that you comply with the provisions of the act, and it is important to this committee that we find out and that is what we propose to do.

Dr. GLENNAN. Right, sir.

Senator JOHNSON. And I just wondered if Mr. Wilkey addressed himself to that point.

Dr. GLENNAN. I think he did in the personal memo, sir.

Senator JOHNSON. Would you read that part of it?

Dr. GLENNAN. Surely. I will be glad to.

Senator JOHNSON. I want to see if he directs his legal talents to section 202 (c) which prohibits other employment.

Now, in view of the fact that you say you are going to go out there on weekends and spend 3 days every 2 weeks working on problems of the university, and in view of the fact that you say that they are going to furnish you rent that is worth $100 or $200 a month, I want it made abundantly clear to all Members of the Senate just what kind of an arrangement it is. I don't pass judgment on the arrangement.

Dr. GLEENAN. Surely.

Senator JOHNSON. I am not asking about his stocks, I will be glad to defer consideration of his stocks to an executive session. But there is not anything here that requires executive session, and all I am asking is whether Mr. Wilkey thinks he complies with the act. Why do we have to have that in executive session?

Senator SALTONSTALL. We don't, Mr. Chairman. I didn't mean to bring up anything. What I was trying to say was that a hasty reading of that memo concerning Dr. Glennan did not cover the conflict of

interest statute. All I wanted to call to the chairman's attention, if Dr. Glennan wishes to have it in the record, I would be very glad to do so, but I believe in his best interests that we should have a discussion with him in executive session.

Senator JOHNSON. The Chair has no objection to having an executive session. I want to get all the information I can here now. We have had his opening statement. He raised a question here. I see no reason for going into executive session to have the answer.

Senator SALTONSTALL. I don't mean on this.

Senator JOHNSON. That is all I am talking about. The Senator can be assured if he desires an executive session, we will have an executive session. I thought I gave him that assurance a moment ago.

Senator SALTONSTALL. I have nothing more to say.

Senator JOHNSON. Proceed.

Dr. GLENNAN. I think, sir, that what I read here answers your question.

Occasional weekend consultations with institute officials as to matters pending during Mr. Glennan's administration and continuing after his appointment also would not appear to constitute engaging in "any other business, vocation or employment." These would be merely informal discussions not involving the discharge of any obligations or duties on Mr. Glennan's part and presumably would be arranged (and, of course, must be) so as not to interfere with his full-time work as Administrator of the NASA.

Senator JOHNSON. Is that the extent of the opinion?

Dr. GLENNAN. That is right, yes.

Senator JOHNSON. Did you discuss with Mr. Wilkey at any time the provision of section 202 (c) of the Space Act?

Dr. GLENNAN. Yes. You see, Mr. Chairman, I was a member of the Atomic Energy Commission and I believe the provisions are essentially similar. He may not hold any other vocation or employment during the period of his appointment.

Senator JOHNSON. On the weekends that you are working at Case, do you propose to do that as long as you are Space Director?

Dr. GLENNAN. No, sir.

Senator JOHNSON. Or do you propose to do that just for a brief time during the transition period when your successor takes over?

Dr. GLENNAN. I would propose to do this until about February 1, which is the end of the first semester, sir. I believe I stated that earlier.

Senator JOHNSON. Senator Bridges?

Senator BRIDGES. No questions.

Senator JOHNSON. Senator Green?

Senator GREEN. Yes.

You regard this as a job for pure science or applied science?

Dr. GLENNAN. Sir, this in my opinion is a job which is both pure and applied science. It involves both pure and applied science.

Senator GREEN. Which is primarily your interest?

Dr. GLENNAN. My personal interest?

Senator GREEN. No. Your interest as a man in this position.

Dr. GLENNAN. I don't think I could answer that definitively until I have had an opportunity, sir, to understand more clearly the programs presently under way and the full import of our charge to get on with this job.

Normally, however, the pure science backup for the work of the applied scientists might be said to be in the 10, 15 percent range.

We have a great deal to do in this Nation in trying to understand better the materials with which we are working. We are pushing all of our materials to the limit of our knowledge of them today, and that sort of backup is certainly a very necessary thing.

Senator GREEN. Did I understand correctly that you feel we haven't knowledge enough yet to know——

Dr. GLENNAN. I would not be able to tell you definitively what sort of a split there would be between applied and pure science.

Senator GREEN. I asked which it was primarily.

Dr. GLENNAN. Well, primarily it would be applied science.

Senator GREEN. Applied?

Dr. GLENNAN. Yes, sir.

Senator GREEN. And which have you had the most experience with?

Dr. GLENNAN. I would expect, sir, in administration and all fields of science, but particularly in applied science, engineering.

Senator GREEN. You feel you are qualified for both. Is that right?

Dr. GLENNAN. Well, modestly I suppose one should say that other people can judge that better than I, but I am willing to try. I have had throughout my working life association in fields of technology entirely.

Senator GREEN. And you feel that in general you are qualified for both. What do you think this job calls for?

Dr. GLENNAN. A great deal of energy, a lot of application and understanding.

Senator GREEN. Primarily.

Dr. GLENNAN. Application and understanding, I think, of the manner in which some of these things get done. It isn't just a matter of the money that is involved, but it is a matter of the people involved and how one best can motivate the people to highest performance.

Senator GREEN. What is primarily the purpose of the investigation?

Dr. GLENNAN. Sir?

Senator GREEN. What is primarily the purpose of the investigation that you are in charge of?

Dr. GLENNAN. To maintain the position of the United States as the leader in space and aeronautical activities.

Senator GREEN. Well, by that you mean in pure science?

Dr. GLENNAN. Pure science, sir, must be the backup for all that we do in applied science so that it is a combination of both, and we will have to either in our own laboratories or through contracts with universities and other research organizations provide the kind of backup that is necessary for the applied sciences.

Senator GREEN. Have you compared facilities that this Government has with facilities that other governments have?

Dr. GLENNAN. I do not know the facilities that other governments have in this area. I know very little about the facilities that we have except through my somewhat vicarious association with the NACA in days gone by. I have known Mr. Dryden for a good many years. The Lewis Flight Propulsion Laboratory is located in Cleveland and I have known people at the Lewis Flight Propulsion Laboratory. Many of their people take graduate work at our institution.

Senator GREEN. So far as you know, are the investigations this Government is making similar to those that other foreign governments are making?

Dr. GLENNAN. I would have to infer that they are, sir. I do not know of certainty myself, but usually in the fields of science and technology, one finds that the field is being attacked broadly on the same bases wherever the activity is undertaken.

Senator GREEN. But in most cases it is kept secret, I take it, to some extent, anyway.

Dr. GLENNAN. Yes. I would think that this is rather normal procedure.

Senator GREEN. That would be your policy as applied to this Government.

Dr. GLENNAN. I think that one would have to pay particular attention to the early stages of any development to determine whether or not it is a development in a field where disclosure of information would be inimical to the best interests of the United States.

On the other hand, one must realize that the way one gets progress in science is not through secrecy but rather through efforts and diligence, through the application of the best efforts of the best trained minds we have.

Senator GREEN. Would it be part of your work to make those decisions?

Dr. GLENNAN. I would think so, sir.

Senator GREEN. Not other people's.

Dr. GLENNAN. I think so.

Senator GREEN. Have you been accustomed to making such decisions?

Dr. GLENNAN. I had some experience with this in the Atomic Energy Commission, sir, where I served for 25 months.

Senator GREEN. Similar.

Dr. GLENNAN. Similar, yes.

Senator GREEN. And you feel competent.

Dr. GLENNAN. I feel I have some competence, sir, yes.

Senator GREEN. Thank you.

Senator JOHNSON. Senator Hickenlooper?

Senator HICKENLOOPER. Thank you, Mr. Chairman.

I may say that I have had the privilege of working with Dr. Glennan before and becoming, I believe, quite well acquainted with his very substantial range of capabilities in the field of science. This was especially true when he served on the Atomic Energy Commission. I not only have the highest confidence in his ability but I am sure that his ultramodest statements about his own competency in this field are a masterpiece of understatement.

I am perfectly willing to testify from my own experience, Dr. Glennan, that I believe you have outstanding capabilities in this field and that your basic familiarity with the needs and requirements of this pioneering agency that we are setting up here is very great indeed.

I just noticed in some of the literature we have here that under your leadership in Case Institute of Technology, the institute has come forward in its standing at least to the point where Dr. Edward Teller, for whom I have the highest respect, ranks your institute among the first four engineering schools in the United States. I think that that record alone would establish at least some very acceptable degree of competence in your administrative and technical ability.

I have no particular questions that I want to ask for the record, Mr. Chairman. I only want to say that I have this added confidence

in Dr. Glennan because of my past association with him. I was very happy at his selection and his willingness to serve.

Dr. GLENNAN. Thank you, Senator.

Senator JOHNSON. Senator Saltonstall?

Senator SALTONSTALL. Mr. Chairman, while I have not known Dr. Glennan as well as Senator Hickenlooper, everything I have known of him would indicate to me that he is a qualified gentleman, and I am glad to see him appointed.

Mr. Chairman, I would say that there are several questions in Dr. Glennan's interest as well as in the interest of the Government that I would like to ask him in executive session.

Senator JOHNSON. The Senator will have that opportunity. Any further questions in open session?

Senator SALTONSTALL. No.

Senator JOHNSON. Senator Bricker?

Senator BRICKER. Only that I am happy to see Dr. Glennan back in public service again. I had hoped when he left the Atomic Energy Commission that he might return someday. I have known him for many, many years, both in an official capacity and in private activities back in Ohio.

Case Institute is one of the fine old institutions of the State. It has never made the great progress as it has made under Dr. Glennan's administration. And I think it not only stands well, as Dr. Teller suggested, among the scientific schools but generally as an educational institution in the State. Some of our fine citizens are graduates of Case and I am mighty happy to commend Dr. Glennan. I am confident he will be an able administrator. I know that he will understand the scientific implications and import of the work over there. I think we will get started in a constructive way through his leadership.

Dr. GLENNAN. Thank you.

Senator JOHNSON. Does that conclude your questioning?

Senator BRICKER. Not a question, but just a statement for the record.

Senator JOHNSON. I just wanted to make sure you don't have any other questions.

Senator BRICKER. No other questions.

Senator JOHNSON. I would like the record to show that Senator Bricker and Senator Lausche, the two Senators from Dr. Glennan's own State, have cleared his appointment and wish to be recorded in favor of his confirmation.

Dr. Glennan, I have received an Associated Press dispatch from Cleveland dated August 9.

Without objection, I would like to include in the record the article from the Washington Star dated August 9 entitled "Space Chief Impressed by Russian Education."

(The document referred to is as follows:)

[From Washington Star, August 9, 1958]

SPACE CHIEF IMPRESSED BY RUSSIAN EDUCATION

CLEVELAND, August 9.—Dr. T. Keith Glennan, head of a new civilian space agency, is impressed by Russian science education, but sputniks do not worry him.

He deplores any criticism of American progress in efforts to conquer space since the Russians put the first earth satellite into orbit last fall.

"We've done a great deal," he said last night. "But you don't do it all overnight."

Dr. Glennan will take an indefinite leave from his post as president of Case Institute of Technology to head a civilian agency dealing with satellites, rockets and space travel.

His nomination as Director of the National Aeronautics and Space Administration was announced in Washington by President Eisenhower late yesterday. He will fly to Washington next Thursday to appear at Senate confirmation hearings. His new assignment will begin about September 1.

The NASA, created last week, will handle all nonmilitary space projects. It apparently will be built on the foundations of the National Advisory Committee for Aeronautics, a quasi-public civilian body which handles basic aeronautical research for the Government.

Dr. Hugh L. Dryden, head of the NACA and before that associated with the National Bureau of Standards, was nominated as Deputy Director of the space agency. Dr. Glennan said he would rely a great deal on the personnel and facilities of the NACA.

Dr. Glennan, who has been president of Case Tech since 1947, also was on leave from the fall of 1950 to the fall of 1952 as a member of the Atomic Energy Commission.

As a scientist-educator he still has fresh in his mind a 15-day trip earlier this summer to Soviet colleges and universities. He said the Russians are making better use of the capitalist incentive system to encourage education that the Americans are.

"They have developed a demand for education because it pays off," he remarked. He emphasized that a student "is paid according to the quality of his work," and that there are 3 to 6 applicants for every scholarship.

"I came back very much impressed by the dedication of Russian students and faculty," he said. "The American people really don't understand how dedication effects Russia's progress in science."

Dr. Glennan, still a month away from his 53d birthday, has been an electrical engineer, a studio manager for two big Hollywood movie outfits, and during the war the head of the Navy's Underwater Sound Research Laboratory.

Senator JOHNSON. You still have fresh in your mind a 15-day trip earlier this summer among the Soviet colleges and universities, correct?

Dr. GLENNAN. Yes, sir.

Senator JOHNSON. Were you on this trip 15 days?

Dr. GLENNAN. I was in the Soviet Union for 15 days and in various parts of the Soviet Union.

Senator JOHNSON. The article indicates that you think the Russians are making better use of the capitalistic incentive system to encourage education than Americans are. Is that your opinion?

Dr. GLENNAN. That is my opinion, sir.

Senator JOHNSON. Would you elaborate on that some?

Dr. GLENNAN. Yes, sir. I visited institutions of higher education in Moscow, Leningrad, Tbilisi, Tashkent, and Alma-Ata out in middle Asia. We talked with the Minister of Higher Education. We talked with the director of the Academy of Science. We saw the director of the Academy of Science in Moscow.

The importance that the Soviets have placed on education generally and on higher education and research and development particularly with relationship to the rest of their economy is very different from ours. This is marked, of course, in the matter of salaries, where a professor who in our country might be paid on the average perhaps as much as 1½ times the salary of a skilled workman—some of them paid somewhat more, but on the average about that—in the Soviet Union they will be paid 5 and 6 times the salary of a skilled workman.

The students are subsidized completely, and beyond that the alternative to acquiring an education is, of course, by comparison not a particularly happy one in that they either go in the army or they go to work at these substantially lower salaries.

Now, the Soviet educational system is not one which I think we should admire. It is a pragmatic system. It is set up to serve their purposes, the kind of a program which the Government establishes. They are not making education available to everyone in the higher educational field at all. They are educating those people that they need. They are not concerned with the individual one little bit. They are concerned only with fulfilling the aims set up by the Council of Ministers. But the implication in my statement was that having seen the dedication and the motivation of these people, the manner in which they are able to direct their energies in any particular field, as they will, the manner in which the people of the Soviet Union seem to feel that their Government has improved conditions for everyone by a very substantial amount, that kind of a feeling I think had somewhat to do with my saying "Yes" when the President asked me to undertake this task, because we need more of that kind of dedication in this country.

Senator JOHNSON. You indicated in your interview, Doctor, that while the Russian sputniks do not worry you, you are quoted as deploring criticism of America's efforts in the field of space. Is that a correct evaluation of your viewpoint?

Dr. GLENNAN. I think this is really not a quotation, Mr. Chairman. I would say that the Russian sputniks certainly worried me. I think that the hysteria in this country following the sputniks perhaps was overdrawn and the search for a scapegoat perhaps a little hysterical. It is obvious that they have done a great deal in the field of applied science, in engineering, in developing the satellite and the propulsion vehicles to place the satellites in orbit.

It seems to me—I hope this is the fact, at least—that they have given us a signal as to their intentions and that the progress which we have made—and I think it very great—now needs perhaps, well, it needs definitely greater energy and more attention.

Senator JOHNSON. Now, who do you refer to as being hysterical?

Dr. GLENNAN. I think the general public in the United States has been quite hysterical about this, more so than I found, by the way, the people that I talked to in Western Europe, and I stopped in Western Europe. I stopped at Brussels, at the Brussels Fair for a day or 2 days.

Senator JOHNSON. You talk about the general American public being hysterical.

Dr. GLENNAN. In this sense, yes, in demanding that we—or at least accusing the governmental laboratories and in general the scientific community in America of a lack of real attention to these problems.

Senator JOHNSON. Do you think that our progress has been equal to the progress that Russia has made in this field?

Dr. GLENNAN. Not in this field; no, sir.

Senator JOHNSON. Do you think the fact that we have not made such progress ought to be a matter of information to the public.

Dr. GLENNAN. Yes, sir.

Senator JOHNSON. To whom do you refer when you say an attempt to locate a scapegoat?

Dr. GLENNAN. I would think, sir, that the articles in the press and radio, the concern by our columnists over matters of this kind was

quite evident, and I think this is an activity in which we as Americans generally indulge from time to time.

Senator JOHNSON. Is it a fair statement of your views to say that you were impressed by Russia's science education but that the sputniks do not worry you?

Dr. GLENNAN. No, sir. It is a fair statement of my views that I was impressed by the attention given in Russia to education in science and engineering; yes, sir; but it is not a fair statement of my views that the demonstrated progress and their ability to put these sputniks in orbit——

Senator JOHNSON. You have seen the Washington Star article of August 9, the Associated Press, which says:

Dr. T. Keith Glennan, head of a new civilian space agency, is impressed by Russian science education, but sputniks do not worry him.

Dr. GLENNAN. I didn't say that.

Senator JOHNSON. You would say that is an incorrect reflection?

Dr. Glennan. That is correct.

Senator JOHNSON (reading):

He deplores any criticism of American progress in efforts to conquer space.

Is that a correct reflection of your views?

Dr. GLENNAN. A correct reflection of my views to a limited extent I don't deplore any criticism in any field. I think that is the way we make progress in America. But I think I have tried to make clear that it is not an easy matter to state that so that one is not subject to criticism, that there has been substantial progress in this country. I think that the activities over the past several years in the laboratories of NACA have been moving in this direction. The activities in other areas of the Government, and these are principally, of course, governmentally financed operations——

Senator JOHNSON. Are they moving as fast as you think they ought to be moved?

Dr. GLENNAN. They are not.

Senator JOHNSON. Is this a correct statement of your views?

[Reading:]

He said—

speaking of Dr. Glennan—

the Russians are making better use of the capitalist incentive system to encourage education than the Americans are.

Dr. GLENNAN. I think that is right.

Senator JOHNSON [reading]:

American people really don't understand how dedication affects Russia's progress in science.

Dr. GLENNAN. I think that is right, sir.

Senator JOHNSON. Are there any general comments, Doctor, that you would like to place in the record about the Space Act of 1958 which the President has just signed and which you will be called upon to administer as leader and Director and the one that this Nation will look to for leadership and inspiration and programing?

Dr. GLENNAN. I think there is nothing that I would want to place in the record, sir, other than the statement that it seems to me that this is an act under which we can get ahead and that if I had not

thought this to be an important activity of this Nation, I should not have accepted the appointment, provided you confirm it.

Senator JOHNSON. Have you read the act?

Dr. GLENNAN. I have read the act; yes, sir.

Senator JOHNSON. Were you consulted in connection with the act?

Dr. GLENNAN. I was not, sir.

Senator JOHNSON. Do you consider the statutory separation of civilian and military projects in the bill a proper and workable determination?

Dr. GLENNAN. I do, sir.

Senator JOHNSON. Are you familiar with the research and development work that has been done by the National Advisory Committee for Aeronautics?

Dr.. GLENNAN. Only in a very limited sense. I really have not had time to try to familiarize myself with this and I would propose that that would be one the first things one would do.

Senator JOHNSON. Do you believe that our civilian space program should be pressed with the same vigor and the same sense of urgency as our military weapons space program must be pressed?

Dr. GLENNAN. In the interests of maintaining this Nation's strength in all of these areas of technology, it seems to me that we cannot do less than our best in attempting to move forward in the civilian space program as we are in the military applications of space technology.

Senator JOHNSON. Do you feel we are not doing our best in either field at this stage?

Dr. GLENNAN. I am not really competent to judge that.

Senator JOHNSON. If you are not competent to judge it, who do you think might be?

Dr. GLENNAN. I am not sure that I know.

Senator JOHNSON. Well, you said, I thought, that you felt progress was slow, and I just wondered if you could speed it up.

Dr. GLENNAN. If I would like to speed it up?

Senator JOHNSON. If you were going to act to speed it up.

Dr. GLENNAN. I hope so, sir.

Senator JOHNSON. Are you familiar with the budget request that the President sent to the Appropriations Committee and is now pending before the Senate?

Dr. GLENNAN. In broad outlines. I believe this is the $125 million.

Senator JOHNSON. For the space agency for the fiscal year 1959.

Dr. GLENNAN. Yes, sir.

Senator JOHNSON. Do you consider that too little or too much?

Dr. GLENNAN. Again, I don't have the basic knowledge of the program that would allow me to give you a straightforward answer to that.

Senator JOHNSON. I can understand that, and I appreciate very much your frankness.

You are not expected to know all the details of a job which you haven't taken, and to which you are not yet confirmed.

My only point in asking the question—I don't want you to feel that you are being tried for something that you have done—is for the committee to have the benefit of any knowledge that you may have on the subject, and, if you don't have it, we will certainly get it next year in in the next year's budget request.

I am somewhat concerned that the President's request was materially reduced by the committee—I rather think under misapprehension. I was concerned at the limited nature of the President's request. After 4 months' hearings, I felt that perhaps his request would be somewhat more substantial than it was. But once he made it there was little to be done. The committee has made rather drastic reductions. I know that officials such as Dr. Dryden and others connected with the project felt that the President's request was very necessary and was very justified, and I shared their viewpoint.

Now, in the light of the reductions, there is going to be an effort made to restore the President's figure, and I wanted to know your opinion if you considered that move essential.

Dr. GLENNAN. Well, Mr. Chairman, activities of the kinds to be undertaken by the NASA are activities that take a long time to bring to fruition, and any delay in getting them started will delay the end results.

Most of the activities are not activities that are started and completed in 2 or 3 months. The bulk of the activities are activities involving good people and the efforts of good people.

The problem here is going to be to expand our ability to do work. You can't get blood out of a turnip, and it doesn't seem to me that with the present organization there is a physical and mental limitation to the amount that can be done, provided that there is adequate funding.

I would hope that you are successful in restoring the President's request. I have great confidence in Dr. Dryden and the other people that I presume must have had something to do with this—Dr. Killian—in preparing that budget request, and I am sure that they are very much concerned about this matter, as I think I am.

I think we need to get on with the job, and the lack of availability of funds to get things started means a delay in the accomplishment of the task which you and the others like you, sir, are concerned with.

Senator JOHNSON. I can understand your lack of familiarity with the details of the budget request.

Here is what I want the record to show:

Do you feel that we should spend the maximum amount that would be productive in this field as soon as possible?

Dr. GLENNAN. I do, sir.

Senator JOHNSON. And you would not hesitate to provide the leadership to do that.

Dr. GLENNAN. That is right, sir.

Senator JOHNSON. Now, I believe your statement indicated that you served as a member of the board of the Cleveland Electric Illuminating Co., a utility, and other companies.

Dr. GLENNAN. Yes, sir.

Senator JOHNSON. And that you plan to resign membership on those boards?

Dr. GLENNAN. I do, sir.

Senator JOHNSON. And you have stock in those companies?

Dr. GLENNAN. I do, sir, and this is a matter in some instances of statutory requirements in the State of Ohio, and then——

Senator JOHNSON (interposing). You propose to go into the question of what you plan to do with your stocks in executive session.

Dr. GLENNAN. I do, sir.

Senator JOHNSON. Senator Anderson?

Senator ANDERSON. I am afraid, Mr. Chairman, that I would be a strongly prejudiced person if I asked Mr. Glennan any questions. I was on the Joint Atomic Energy Committee when he was on the Atomic Energy Commission. I have traveled with him. I have come up and talked in his part of the country when he has desired it. I am strongly in favor of his confirmation.

I think he has a mind that is very receptive to ideas.

I think he has a pair of eyes that are perceptive to things going on around the world. Anything I say could only be complimentary about the witness. I don't think there is any point in my asking him any questions.

Senator JOHNSON. Thank you, Senator Anderson.

Senator Symington?

Senator SYMINGTON. No questions, Mr. Chairman.

Senator JOHNSON. Mr. Glennan, if you will just stand aside—it is all right for you to be where you are. Just wait around until we go into executive session, when we have completed our examination of Dr. Dryden.

(Thereupon, at 11:05 a. m., further proceedings were had in the matter of confirmation of the nomination of Dr. Hugh L. Dryden.)

NOMINATION OF DR. HUGH L. DRYDEN TO BE DEPUTY ADMINISTRATOR OF NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Senator JOHNSON. Dr. Dryden, we are glad to have you before the committee. We know that you have appeared before congressional committees many times and for many years, and that you are frank and candid and dedicated. We will be glad to have you make any statement in connection with your nomination that you feel appropriate.

STATEMENT OF DR. HUGH L. DRYDEN, DIRECTOR, NACA, NOMINEE TO BE DEPUTY ADMINISTRATOR, NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Dr. DRYDEN. I will present a brief biographical review.

I was born in Pocomoke City, Md., in 1898, which makes me 60 years of age.

My father— I didn't know this before, but my father was a streetcar conductor in Baltimore, which gives me a little kinship with Keith. My father has been dead for quite a number of years.

My mother is still living.

I have a brother in Hyattsville, Md.

I married Mary Libby Travers, of Baltimore, in 1920. We have three children: a son, Hugh, junior, who is an organic chemist with the G. D. Searle Co., doing research work; a daughter, Ruth, who is married to a mathematician of the Naval Ordnance Laboratory; and a daughter nearly 18, who has just graduated from high school and is about to enter the university next year.

I am a Protestant, belonging to the Methodist Church. I am registered in Montgomery County as a Democrat.

As for my education, it was in the public schools of Baltimore. I graduated from the high school which is known as Baltimore City College. I went to Johns Hopkins University, receiving a bachelor of arts degree in 1916, a doctor of philosophy in physics in 1919.

I joined the staff of the National Bureau of Standards in 1918, and I have been a Government civil servant ever since.

At the Bureau of Standards, I was first employed in connection with the inspection of munitions gages during the war but was soon transferred into the Wind Tunnel Section in aerodynamic work. One of the early jobs was to find out something about the characteristics of the wings of German aircraft that had been used in World War I. I was made the Chief of this Section in 1920 and, in 1934, the Chief of the Mechanics and Sound Division, of which the Wind Tunnel Section was a part.

During this time I was essentially the leader of a small group engaged in basic research in aerodynamics. The work was supported by transfer of funds from the National Advisory Committee for Aeronautics; so that almost from the very beginning, I have had very close ties with the NACA.

As World War II came on, with the establishment of Dr. Bush's Office of Scientific Research and Development, I was given charge of a guided-missiles project which involved the cooperative efforts of an electronics group from the radiation laboratory at MIT, officers and enlisted men from the Navy, civilians from the Bureau of Standards.

This work resulted in the radar homing guided missile BAT, which was used during the war against the Japanese. Of course, now it is a very obsolete type of missile.

For that work I received the Presidential Certificate of Merit.

Also, just about at the close of the war in Europe, I was loaned half time to General Arnold of the Air Force to serve as Deputy Director of the Air Force Scientific Advisory Group, which group was given the mission of going into Germany and into England, also Switzerland, to see how the Germans and some of our European friends had used science in connection with military problems. I had served in this position under Dr. von Karman, whose name may be known to you. Both of us had known the German scientists before the war.

We arrived in Germany on V–E Day and interviewed a number of scientists and obtained a picture of the German organization of science during the war.

We then came back to this country and wrote a series of reports which formulated plans for the technological future of the Air Force. I have had a connection with the Air Force Scientific Advisory Committee, as it is now called, since that time.

I closed my career at the National Bureau of Standards as an Associate Director. I left in 1947, when the previous Director of NACA became ill, to accept the position of Director of Research, as it was then called. The name was later changed to Director.

You may recall that 1947 is the year of the first flight of an airplane at sonic speed, the speed of sound. So I entered the organization just a month or two before this accomplishment by Chuck Yeager, and have been of course involved in the administration of the scientific activities of the NACA for the past 11 years.

Among the awards and honors received were the Reed Award of the Institute of Aeronautical Sciences. I received a Medal of Freedom for the work with the Air Force Scientific Advisory Group. The Daniel Guggenheim Medal has been awarded to me as well as the Wright Brothers' Memorial Trophy, and the Career Service Award of the National Civil Service League, recently.

I have seven honorary doctorates from various institutions, which are listed in the sketch that you have.

I am an honorary fellow of both of the great institutes or societies dealing with aeronautical sciences, the Institute of Aeronautical Sciences in this country and the Royal Aeronautical Society in England.

I have given before both societies lectures in honor of the Wright Brothers. These lectures are considered in themselves as honors and, just this past May, I gave in Germany before the German Aeronautical Society the second lecture devoted to the memory of Ludwig Prandtl, one of the great German pioneers.

I hold a number of memberships in scientific societies and I am connected with various committees relating to the Government.

I am a consultant to the Scientific Advisory Committee to the President.

I don't think I need to go into all of these.

I am a member of the National Academy of Sciences and at present serving as its home secretary.

I am a member of the board of trustees of the National Geographic Society.

I hold membership on the executive committees of several international scientific organizations, the International Union of Theoretical and Applied Mechanics, which has nothing to do with the trades but refers to a branch of physics; with the newly organized Congress of the Aeronautical Sciences.

I am one of the United States members, national delegates, to the NATO Advisory Committee on Aeronautical Research and Development.

I have no industrial connections. My small savings are in Government bonds, savings accounts, and life insurance.

I think that is a quick rundown on the personal aspects.

(Biographical sketch and list of publications is as follows:)

HUGH LATIMER DRYDEN

Hugh Latimer Dryden, Director of the National Advisory Committee for Aeronautics, has headed the staff of the Government's aeronautical research agency since 1947. At that time he was Associate Director of the National Bureau of Standards, where he had served since 1918 in scientific research.

Dr. Dryden has gained a broad knowledge of aeronautics in his career and in service on numerous technical groups for the Armed Forces and other agencies of the Government. He has made numerous technical contributions by research in high-speed aerodynamics, fluid mechanics and acoustics. He has published more than 100 technical papers and articles in professional journals.

Born July 2, 1898, in Pocomoke City, Md., the son of Samuel Isaac and Nova Hill (Culver) Dryden, he was reared in Baltimore, where he attended the public schools and was graduated with honors. He earned his way through Johns Hopkins University, completing the 4-year bachelor of arts course in 3 years, again graduating with honors.

Influenced by the late Dr. Joseph S. Ames, who for many years was chairman of the NACA and was himself a pioneer in aerodynamics, Dryden undertook a study of fluid dynamics at the Bureau of Standards while continuing his courses at the Johns Hopkins University Graduate School. His laboratory work was accepted by the university when it granted him in 1919 the degree of doctor of philosophy.

Dr. Dryden was promoted in 1920 to head the Bureau's Aerodynamics Section. In 1924, collaborating with Dr. Lyman J. Briggs, he made some of the earliest studies of airfoil characteristics near the speed of sound. With A. M. Kuethe, he published in 1929 the first of a series of papers on the measurement of turbulence in wind tunnels and on the mechanics of boundary layer flow. His nonaeronautical work included comparative tests to determine the efficiency of roof ventilators, and investigation of pressures exerted by wind upon building structures, cylinders, and chimneys. He was advanced to Chief of the Mechanics and Sound Division of the Bureau in 1934, and in January 1946 to Assistant Director. Six months later he was appointed Associate Director.

While carrying out the Bureau's special research program on structures and building materials, Dr. Dryden continued his studies of aerodynamics, where his main interests lay in turbulence and control of the boundary layer. It was natural that, when he was selected to deliver the 1938 Wright brothers lecture before the Institute of the Aeronautical Sciences (the first American so honored) he chose the subject Turbulence and the Boundary Layer. The institute in 1940 presented him the Sylvanus Albert Reed award.

In World War II he served on several technical groups advising the Armed Forces on aeronautical matters and guided missiles. As head of the Washington

project of the National Defense Research Committee he led development of this country's first and only guided missile successfully used in combat, the radar-homing Bat. This achievement won him the Presidential Certificate of Merit in 1948. He served on other committees advising the Joint Chiefs of Staff, NACA, the Army Ordnance Department and the Army Air Forces, on guided missiles. Following the end of war he continued his interest in the Bureau's guided-missiles-development program.

In 1945 Dr. Dryden was made Deputy Scientific Director of the AAF Scientific Advisory Group appointed by General Arnold to prepare a report as a guide for future AAF research and development programs. With this group he traveled to Germany, France, England, and Switzerland studying foreign scientific efforts in the development of aeronautics and aerial weapons, especially guided missiles. The Army in 1946 awarded him the Nation's second highest civilian decoration, the Medal of Freedom, for "* * * an outstanding contribution to the fund of knowledge of the Army Air Forces with his research and analysis of the development and use of guided missiles by the enemy."

Dr. Dryden was elected to represent the United States at the Sixth International Congress for Applied Mechanics, in Paris, 1946, and again at the Seventh Congress, Istanbul, 1952. In 1948 he was appointed an honorary officer, civil division, Order of the British Empire, and was selected in 1949 to deliver the 37th Wilbur Wright memorial lecture before the Royal Aeronautical Society, in London.

Meanwhile, in 1947 he resigned from the Bureau of Standards to become Director of Aeronautical Research at the NACA. Two years later the agency gave him added responsibilities and the new title of Director, his present position. In this capacity he has charge of an expanding research organization with some 8,000 employees, 3 large laboratory centers, and 2 smaller research stations.

Dr. Dryden is a member of several scientific advisory committees to Government agencies, including the Technical Advisory Panel on Aeronautics, Department of Defense; the Scientific Advisory Board of the Chief of Staff, United States Air Force; the Scientific Advisory Committee to the President; the Interdepartmental Committee on Scientific Research and Development (Chairman, 1951–55); the Scientific Advisory Committee of the Ballistics Research Laboratory, Aberdeen Proving Ground, and the Advisory Group for Aeronautical Research and Development, North Atlantic Treaty Alliance.

Dr. Dryden has written 17 technical reports for the NACA. Results of his work have been published in professional and trade journals, dealing with the properties of airfoils at high speeds, wind-tunnel investigations, boundary layer and turbulence, noise suppression, and other aeronautical matters. He was editor of the Journal of the Institute of the Aeronautical Sciences from 1941 to 1956. He is on the board of editors of both the Quarterly and Applied Mathematics and the aeronautical publications program of Princeton University. In 1950 he received the Daniel Guggenheim Medal for "outstanding leadership in aeronautical research and fundamental contributions to aeronautical science." In 1955 he received the Wright brothers memorial trophy for "significant public service of enduring value to aviation in the United States." In 1958 he was elected to the Baltimore City College Hall of Fame. Dr. Dryden was honored by the National Civil Service League with the Career Service Award for 1958.

Dr. Dryden is home secretary of the National Academy of Sciences; president, 1952–56 (vice president since 1956) of the International Union of Theoretical and Applied Mechanics; life member and trustee, National Geographic Society; honorary fellow and former president (1943), Institute of the Aeronautical Sciences; honorary fellow of the Royal Aeronautical Society; fellow of the Royal Aeronautical Society; fellow of the American Academy of Arts and Sciences; fellow of the American Physical Society, and member of a number of other professional organizations and clubs.

He holds these honorary degrees:

Sc. D.: Polytechnic Institute of Brooklyn, 1949.
D. Eng.: New York University, 1950.
D. Eng.: Rensselaer Polytechnic Institute, 1951.
Sc. D.: University of Pennsylvania, 1951.
Sc. D.: Western Maryland College, 1951.
LL. D.: Johns Hopkins University, 1953.
D. Eng.: University of Maryland, 1955.

Dr. Dryden is married and has 3 children, a son, Hugh Latimer, Jr., and 2 daughters, Nancy Travers Dryden and Mrs. Andrew Van Tuyl, Silver Spring, Md. He is active in the work of the Men's Bible Class of the Calvary Methodist Church in Washington. He has held a Methodist local preacher's license since

his college days, when he had charge of the Idlewylde Church of Baltimore. He continues this activity on occasion. The Dryden family lives at 5606 Overlea Road, Washington 16, D. C.

MEMBERSHIPS AND ACTIVITIES

Member, Council of the International Union of Theoretical and Applied Mechanics; treasurer 1948–52; president 1952–56; vice president since 1956.
Member, National Academy of Sciences, Chairman of Engineering Section, 1947–50; Governing Board, 1953; home secretary since 1955.
Board of trustees, life member, member of research committee and executive committee, the National Geographic Society.
Honorary fellow, Royal Aeronautical Society, 1956.
Honorary fellow, Institute of the Aeronautical Sciences; president, 1943.
Fellow, American Academy of Arts and Sciences, 1958.
Fellow, American Physical Society; chairman, fluid dynamics committee, 1949.
Member, American Society of Mechanical Engineers; chairman, publications committee, 1944–48; board of technology, 1949–51.
Member, Washington Academy of Sciences; committee on science education, 1954; president, 1946.
Member, American Association for the Advancement of Science.
Member, Philosophical Society of Washington; president, 1934.
Member, American Philosophical Society.
Member, Cosmos Club; president, 1949.
Phi Beta Kappa.
Sigma Chi.
Sigma Tau.
Member, Advisory Council of the Daniel and Florence Guggenheim Institute of the Air Flight Structures.

LIST OF PUBLICATIONS BY HUGH L. DRYDEN

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Senator GREEN. Thank you very much.

May I ask a few questions?

This is a very impressive list of publications in the last 38 years, and I assume that your ideas have progressed and changed somewhat in the meantime.

Dr. DRYDEN. These are mainly specialized and technical publications, you will notice, although there are some of a general character.

Senator GREEN. All the more subject to change, are they not?

Dr. DRYDEN. Yes.

Senator GREEN. What proportion of them would you repudiate now?

Dr. DRYDEN. None of them would be repudiated, but the interest in them has passed very considerably.

Senator GREEN. I am not speaking about the public interest, but I am speaking about the facts or the theories on which you based them.

Dr. DRYDEN. The facts are still true. Some of the interpretations, perhaps, are modified during the years.

Senator GREEN. But have your theories changed that you have based those facts on?

Dr. DRYDEN. They have changed gradually during the years.

Senator GREEN. To a considerable degree?

Dr. DRYDEN. To a considerable degree. Science is that way.

Senator GREEN. Are they changing every year?

Dr. DRYDEN. They change slowly. The change in 1 year is a little hard to see; but if you look for 5 years, you will find that there has been a shift in knowledge.

Senator GREEN. If you look back 30 years, they are still more.

Dr. DRYDEN. But the experiments themselves, the results of the experiments, are still just as true today as they ever were, and you can repeat the same experiments and get the same answers. The deductions you draw are somewhat different. You have more knowledge. You have made more experiments. You understand things better.

Senator GREEN. And you expect to progress, too, in that direction.

Dr. DRYDEN. You expect this to happen continually; yes.

Senator GREEN. It is such a broad scope of investigation, there must be something that you are particularly interested in.

What are your specialties?

Dr. DRYDEN. My special interest, as you will gather from that list—and, really, the only technical subject that I have tried to keep up with as a specialist since I have been involved mainly in administrative work now for the past 18 years—is in a relatively narrow field: the basic research on the flow of air very close to solid surfaces, what the technicians call flow in boundary layers, and in the turbulent motion of fluids.

Senator GREEN. Are you interested in applications of scientific theories of yours?

Dr. DRYDEN. The work in this area—again I should let other people say this, I think, but it has contributed to a great degree to understanding what experiments in wind tunnels mean, so what degree the results on models applied to full-scale articles. It has given a basic understanding, a framework which all designers nowadays take as a matter of course. It is part of the knowledge learned in school. It was not that way when we first started in 1920. So it does contribute to applications.

Senator GREEN. How does that affect your relations with other scientists?

Dr. DRYDEN. Well, I think I am an accepted member of the fraternity. I don't know just exactly what you have in mind.

Senator GREEN. Well, what I had in mind is, is there a free interchange of views?

Dr. DRYDEN. Oh, yes, sir. This is all——

Senator GREEN. Internationally as well as nationally?

Dr. DRYDEN. Internationally. In this area. Its basic science area.

Senator GREEN. You are free to give all the information you have to foreigners?

Dr. DRYDEN. In the basic science area. Not all the information in NACA, not the results of the work of NACA, but in this area on the technical field in which I personally qualify as a scientist, this is an entirely open field.

Senator GREEN. Outside of that special field, do they give all other information?

Dr. DRYDEN. No, sir.

Senator GREEN. They do not.

Dr. DRYDEN. In the other field I am an administrator and not a practical scientist.

Senator GREEN. Well, do you receive all the information they could give you or all they——

Dr. DRYDEN. Yes, sir.

Senator GREEN. Or are they secretive to some extent?

Dr. DRYDEN. Not in the general science areas. Now, in military applications to weapons, there are other nations and ourselves bound by the security agreements that are negotiated.

Senator GREEN. Well, would you say that the distinction was in pure science that there is exchange; in applied science there was not?

Dr. DRYDEN. This applied science is more limited. As a general characterization I would say it is true.

Senator GREEN. Your specialty is pure science.

Dr. DRYDEN. As a personal scientist, not as a director of NACA.

Senator GREEN. Well, what nations produce the best pure scientists in this field?

Dr. DRYDEN. Well, as of the present moment, in Germany, England, and Japan are the ones who have contributed to boundary layer investigations, and the United States. The United States I think is the leader.

Senator GREEN. I notice you omit Russia.

Dr. DRYDEN. Russia has done much less in this. They have a number of important contributions, but generally speaking the Russians are more interested in applications in this particular field.

Senator GREEN. Perhaps they proceed on the theory that they won't communicate the other.

Dr. DRYDEN. They do present papers in this field openly. I attended a meeting in Germany last year in which three Russians gave papers in the field of aerodynamics, in the science of aerodynamics, and the Russians have participated in a few instances in the scientific side of aerodynamics, fluid mechanics, not aeronautics.

Senator GREEN. In general would you say they are ahead of us?

Dr. DRYDEN. No, they are not in this field. I am sure they are not in this field.

Senator GREEN. Either in theory or——

Dr. DRYDEN. In other branches of science they are most decidedly ahead of us. There are many other areas. In this particular one they do not happen to be.

Senator JOHNSON. Senator Hickenlooper, pardon me just a moment. I should like for the record to show that our two distinguished Senators from Maryland, Dr. Dryden's home State, both have informed the committee of their pleasure at the nomination and their desire to see the committee act favorably. And I should like for the record to show that.

Thank you, Senator Hickenlooper.

Senator HICKENLOOPER. Thank you, Mr. Chairman. I only want to say that in our association with Dr. Dryden, we are very happy that he is going to occupy this position in connection with this new agency. And I am personally happy about his nomination.

I don't have any questions.

Senator JOHNSON. Senator Anderson?

Senator ANDERSON. Dr. Dryden, you are pretty strongly in favor of whatever we do in the space field be done by an airship of some kind? By airplanes?

Dr. DRYDEN. Not at all, sir. You will find that our program does not include that particular area at the moment.

Senator ANDERSON. I questioned before the fact that you killed the proposal for early nuclear flight.

Dr. DRYDEN. I don't think that is a correct statement.

Senator ANDERSON. What would be a correct statement?

Dr. DRYDEN. A correct statement was we pointed to certain problems which we thought should be given greater emphasis which would lead to earlier successful nuclear flights.

It is still going forward to the best of my knowledge.

Senator ANDERSON. Going forward?

Dr. DRYDEN. To the best of my knowledge.

Senator ANDERSON. Was the Navy project turned down?

Dr. DRYDEN. There was a specific Navy project which I think has not been approved by the Department of Defense.

Senator ANDERSON. Do you know of any project that has been approved.

Dr. DRYDEN. A project is being carried on at present in General Electric Co., I think still going forward at full speed.

Senator ANDERSON. But it is not designed for early flight distances.

Dr. DRYDEN. I think they will fly just as soon as they possibly can.

Senator ANDERSON. Oh, I think they will, under the circumstances, if they can get it up by 1980, 1990, the year 2000, or as early as they can, but it is not early flight, is it?

Dr. DRYDEN. It depends on your definition of early flight.

Senator ANDERSON. Well, we lawyers call it a word of art. When we refer to early nuclear flight, we refer to the fact that people are going to put a nuclear propulsion device into a flying ship like the British flying ship and find out what the problems are inherent in the nuclear propulsion field. You opposed that study.

Dr. DRYDEN. No. We did not. We asked a question as to the prospective chances of success of a particular design. We said we thought there was a great risk that this airplane would not fly on nuclear power, this particular one, and we do not oppose it. We are all for the nuclear airplane project. We honestly want to see it a success at the earliest possible moment. We gave a technical opinion on a particular combination.

Senator ANDERSON. And you don't think that technical opinion successfully killed it when it was announced as a result of such opinion that it was killed?

Dr. DRYDEN. I have not heard an announcement that it was killed.

Senator ANDERSON. There were four people on the panel—Dr. Bacher, General Doolittle, you, and I have forgotten the other.

Dr. DRYDEN. There was a panel in the Department of Defense with which you are, of course, very familiar which was asked whether this project should be expedited in a certain way.

Senator ANDERSON. We did have the belief that nuclear science would be a good thing. What in your background led you to believe that nuclear power——

Dr. DRYDEN. We dealt only, sir, with the performance of the airplane. We have a lot of background in knowing what airplane performance is with certain weights of powerplants, with certain designs of airframes.

Senator ANDERSON. But you based your decision on shielding that was going to be necessary when Admiral Rickover says——

Dr. DRYDEN. We took the estimates of the engine manufacturer as to what the powerplant would weigh. We took the estimates of the structural people as to what the structural airframe would be, what the performance of the derated engine would be, and we said if there was the slightest slippage in any of these figures, the reactor will actually go along for the ride in that particular design, and that is the extent of our participation in that project.

Senator ANDERSON. Whether you did or didn't think that you killed it, did it die right then?

Dr. DRYDEN. The only thing that died as far as I know was a request to put more dollars into it.

Senator ANDERSON. Did that not help, eventually, to make things die—they refused to give them an appropriation?

Dr. DRYDEN. It has an appropriation, sir.

Senator ANDERSON. The project for early flight has an appropriation—would you state that on the record, please?

Dr. DRYDEN. I state that the original project is going forward to get a nuclear airplane at the earliest possible date.

Senator ANDERSON. By completely designing the airplane and not trying to use what seemed to many people as a desirable thing, namely, the incorporation of a nuclear powerplant into an existing airplane to see what particular characteristics it might have in order that one might be designed better?

Dr DRYDEN. The only thing we expressed a technical opinion on was a particular design of a particular airplane with the performance characteristics furnished by the engine manufacturers. The possibility of the success or failure of the project did not lie with us.

Senator ANDERSON. Well, I am sorry—it ended up with the Secretary of Defense. The Atomic Energy Commission was very happy to have it; was it not?

Dr. DRYDEN. I do not know to what exact extent. The Atomic Energy Commission was mentioned because they are jointly in this project.

Senator ANDERSON. Are you familiar with Dr. Goddard's work in rockets?

Dr. DRYDEN. Yes.

Senator ANDERSON. Did you support any of the work that he did?

Dr. DRYDEN. It was long before my time, when I was not in any position to support his work. What I mean is, I had a position with the National Bureau of Standards which did not involve the putting out of contracts to other groups.

Senator ANDERSON. Dr. Goddard had an idea that the rocket could be useful.

Has any of your thought been directed to the possibility that it might be used?

Dr. DRYDEN. I had not been connected with rockets until I came with the NACA in 1947. As I have told you, I found myself with an airplane about to fly with a rocket engine, the X–1.

Senator ANDERSON. Was Dr. Goddard alive in 1947?

Dr. DRYDEN. He was working on a project supported by the Navy the last time I met him. He was then down at Annapolis working under the support of the Navy.

Senator ANDERSON. And did he not design the rocket which he offered the United States Government in 1930 or soon thereafter, which was almost the exact design of the V–2, and the Germans took the V–2 or that rocket and perfected it?

Dr. DRYDEN. The general concept was the same.

Senator ANDERSON. It was known in the United States?

Dr. DRYDEN. I think that that was unfortunate that Goddard was not supported, but I say that I was not in a position to have anything whatever to do with this.

Senator ANDERSON. In this 1947 responsibility, did you pick up any of the ideas that Dr. Goddard had?

Dr. DRYDEN. We were then using a rocket engine. I do not know. The people who developed this rocket engine were very great admirers of Dr. Goddard. I do not know whether he personally was involved in the company or not.

Senator ANDERSON. In the proposal for a man-into-space flight, does not your present inclination depend entirely upon liquid propulsion?

Dr. DRYDEN. If you want to do it very soon, that is my idea.

Senator ANDERSON. Have you examined this particular impulse as compared to the nuclear engine?

Dr. DRYDEN. The nuclear engine will be applied to a space vehicle as soon as it can be developed. I supported the expediting of the Rover project engine.

Senator ANDERSON. Would it be your opinion that the Rover project has been expedited like the plan to develop a chemical engine?

Dr. DRYDEN. More so. They have much more money at the present time—they have only 2 or 3 million in the large chemical rocket.

Senator ANDERSON. Would it be your opinion that the cost of the plant to build the rocket would run 2 or 3 million dollars? Or two or three hundred million dollars?

Dr. DRYDEN. You mean the plant to build the engine?

The development of the engine to a final flight stage would, certainly, cost several hundred million dollars.

Senator ANDERSON. Yes; that is it, exactly. And the effort will be to spend the money that way instead of trying to emphasize Rover.

Dr. DRYDEN. The budget carries more for Rover than it does for the large chemical rocket. More money for Rover.

Senator ANDERSON. Technically, that might be correct. They will spend the money. The emphasis will be on the chemical and not on the nuclear.

Dr. DRYDEN. Both are going to be carried forward.

Senator ANDERSON. The specific impulse of the nuclear propulsion is somewhat higher—would you say that it is 2 or 3 times?

Dr. DRYDEN. It is higher, but many years further away.

Senator ANDERSON. Will there be one tested this fall?

Dr. DRYDEN. Not that I know about.

Senator ANDERSON. Does the Air Force have to develop the airframe and——

Dr. DRYDEN. It is not the airframe.

There is no Rover engine in existence that is capable of such a flight, and the estimate of the Atomic Energy Commission laboratories are that this is a matter of 5 to 10 years.

Senator ANDERSON. Which laboratory?

Dr. DRYDEN. Both laboratories. Mr. Merkle has made the statement on the record.

Senator ANDERSON. Of course, I would rather have the testimony from Dr. Schreiber, who is the head of this.

Dr. DRYDEN. Yes. I think you will find a similar statement in the hearings of the House Space Committee to the effect of 5 to 10 years—5 years is the most optimistic—and 10 years—it all depends on what trouble you will run into and the tests you will have to make.

Senator ANDERSON. Are you familiar with Project Pluto?

Dr. DRYDEN. Yes. I am familiar with that.

Senator ANDERSON. What is your position on that?

Dr. DRYDEN. I had no occasion to take any position on Pluto. It is not a space vehicle.

Senator ANDERSON. And is there a plane called the X–15?

Dr. DRYDEN. There is—about to fly. We started on that 5 years ago—6 years ago.

Senator ANDERSON. If it is successful in going up to 100 miles, would that persuade you to recommend flight for it?

Dr. DRYDEN. It is a research airplane; it studies the problems of space flight. The X–15 is a research airplane to study the general problems of future space flight.

Senator ANDERSON. The fact that you have been steadfastly connected with these projects which would contribute to the growth of the airplane companies would not then persuade you against trying to develop space vehicles?

Dr. DRYDEN. The NACA has often done work in support of missile contracts. We have been connected with all of the missile development.

Senator ANDERSON. Yes; only to get the missile contracts to the present airplane contractors; is that not correct?

Dr. DRYDEN. We have nothing to do with contracts in the NACA. We will have in the new agency, but we had no contracts with them in NACA.

Senator ANDERSON. Are you aware of the effort now being made to take Project Rover away from Los Alamos and give it to the company in California?

Dr. DRYDEN. No; I am not familiar with that.

Senator ANDERSON. But it would be your hope that we might develop some space vehicles, then, providing it would not interfere with the airplane development?

Dr. DRYDEN. No, sir; the whole budget that you have before you is for space vehicles. There is not a thing in there for airplanes.

Senator ANDERSON. You are not enthusiastic about the prospects of this nuclear jet propulsion?

Dr. DRYDEN. Yes, I am; but not next year or the year after or any of the years that I will be in the Government.

Senator ANDERSON. It might be that if the same effort that was expended for submarines had been employed, that you would have like propulsion now on space vehicles.

Dr. DRYDEN. I believe in taking the same approach in space vehicles that was——

Senator ANDERSON. Not at all. Not at all.

The thing is that Admiral Rickover's idea had not been proven; he went ahead and jumped on something long before it had been proven.

You are opposed to a space flight until everything has been worked out and we have a designed ship.

Dr. DRYDEN. I do not think so, sir. If it is a design matter, technically, I will give you an honest technical opinion.

Senator ANDERSON. You did not have any technical background on which to support that?

Dr. DRYDEN. I did not have an opinion whether the powerplant would deliver the power that it needed. I was an expert on the flight of airplanes.

Senator ANDERSON. That is all.

All I want to say is that you successfully opposed the Navy hope.

Dr. DRYDEN. I think this is not the place to discuss that particular question.

Senator ANDERSON. Perhaps not.

I have never found any public place that it was proper to discuss it; but, nevertheless, it is there.

Senator JOHNSON. Mr. Saltonstall?

Senator SALTONSTALL. I have no questions.

I have worked with Dr. Dryden in the Appropriations Committee over the last 10 or 12 years, in connection with the NACA. I will say that he has constantly grown, certainly, in my esteem, and it is worth listening to him; and I admire his ability to present a case to Congress.

Senator JOHNSON. Senator Bricker.

Senator BRICKER. I am very happy to see Dr. Dryden in this position and to have listened to him testify, as I have many times.

I have been associated with him in the atomic cancer research work.

I have gone over his list of publications, and I have listened to his testimony here this morning; and there is one question that I wanted to ask: What have you been doing with your spare time?

Dr. DRYDEN. What you see here. This is the list.

Senator BRICKER. It is a great contribution in the scientific field, and I want to compliment you.

I read many of your articles long before I knew you.

Dr. DRYDEN. Thank you.

Senator JOHNSON. Are there any other questions?

Dr. Glennan, without objection, we will insert in the record a very brief hearing conducted by the late chairman Senator McMahon in connection with your confirmation in 1950, at which were present Senators McMahon, Hickenlooper, Millikin, Knowland, and Bricker. (The document dated August 16, 1950, is as follows:)

CONFIRMATION OF THOMAS KEITH GLENNAN TO BE A MEMBER OF THE ATOMIC ENERGY COMMISSION

CONGRESS OF THE UNITED STATES,
JOINT COMMITTEE ON ATOMIC ENERGY,
Washington, D. C., Wednesday August 16, 1950.

The joint committee met at 10:30 a. m., pursuant to call, in room 48–G of the Capitol, Senator Brien McMahon (chairman of the joint committee) presiding.

Present: Senators McMahon (chairman), Hickenlooper, Millikin, Knowland, Bricker; and Representatives Durham (vice chairman), Price, and Elston.

The CHAIRMAN. Gentlemen, the committee will be in order.

Gentlemen, we have with us this morning Dr. Thomas Keith Glennan. Dr. Glennan has been nominated by the President for the vacancy on the Atomic Energy Commission, and I believe you have before you, gentlemen of the committee, a list of his experience and directorships.

Now, Dr. Glennan, will you make a brief statement about your past work and education?

STATEMENT OF DR. THOMAS SMITH GLENNAN, CLEVELAND HEIGHTS 6, OHIO

Dr. GLENNAN. I think, Senator McMahon, it is set forth pretty accurately on this paper. I would be glad to answer any specific questions that you might have.

I would say only that my activities for the past 20 years have been principally in administrative and management or executive work in enterprises which have been based largely on science and engineering.

The CHAIRMAN. From 1927 to 1935, when you started with Electrical Research Products, were you in the laboratory or in the business end?

Dr. GLENNAN. I was in the business field almost entirely. As a matter of fact, a couple of those years were spent abroad in London and on the Continent, and that was in the installation and operation and servicing of sound motion picture equipment in the early days of sound motion pictures.

The CHAIRMAN. That is what led into the active participation in the motion-picture business? Was that in California?

Dr. GLENNAN. That is quite right, sir.

Senator KNOWLAND. Mr. Chairman, I suggest that the memorandum which we have before us be included as a part of the record at this point, if that is agreeable.

The CHAIRMAN. That will be done.

(The statement of qualifications referred to follows:)

"THOMAS KEITH GLENNAN (EDUCATOR)

"Born: Enderlin, N. Dak.; September 8, 1905.
"Address: Home, 2530 Fairmount Boulevard, Cleveland Heights 6, Ohio.
"Degrees:
"1927: Bachelor of science, Yale University.
"1947: Doctor of science, Clarkson College.
"1950: Doctor of science, Oberlin College.
"Experience:
"1927–35: With Electrical Research Products, Inc.
"1935–39: Operations manager, Paramount Pictures, Inc.
"1939–41: Studio manager.
"1941–42: Studio manager, Samuel Goldwyn Studios.
"1942–45: Director, United States Navy Underwater Sound Laboratory of Columbia University.
"1945–47: Executive, Ansco (General Aniline & Film Co.), Binghamton, N. Y.
"Since 1947: President, Case Institute of Technology, Cleveland, Ohio.
"Directorships:
"Deputy Chairman of Committee on Ordnance, Research and Development Board, National Military Establishment.
"Member, board of directors, Cleveland Electric Illuminating Co.
"Member, board of directors, Equity Savings & Loan Co. of Cleveland.
"Member, board of trustees, Cleveland Clinic Foundation.
"Awards: Medal of Merit by United States Government for services at Underwater Sound Laboratory."

The CHAIRMAN. This directorship of the United States Navy Underwater Sound Laboratory of Columbia University; I believe that is at New London, Conn.?

Dr. GLENNAN. That is quite right.

The CHAIRMAN. And you spent 3 years there?

Dr. GLENNAN. That is right.

The CHAIRMAN. Did that require active scientific work, or was that in a managerial capacity?

Dr. GLENNAN. I would say it was a combination of both. Perhaps I can best describe it as requiring intuitive scientific or engineering judgment. That is a round term, but it is a very accurate one in a situation such as that.

The CHAIRMAN. And from 1945 to 1947, I notice you were an executive in General Aniline & Film Co. What position did you fill?

Dr. GLENNAN. I was assistant production manager at the Ansco Division in Binghamton for about 6 months, and then became manager of administrative services, which included quite a variety of the engineering, service and industrial relations functions.

The CHAIRMAN. Then I notice you went to Case.

Dr. GLENNAN. That is right.

The CHAIRMAN. I have no other questions.

Senator BRICKER. I would like to say for the record that when I heard of Dr. Glennan's appointment, I was pleased, coming from my State. He has been a resident there for some little time.

I called some of my friends in Ohio, members of the board of Case, whom I happened to know well, as the doctor knows. I got two reactions. The first was that they were sorry to lose him at Case; and the second, that they were glad that the Atomic Energy Commission was getting a man of his sturdy Americanism, patriotism, and ability.

So I just wanted that to go in the record as a matter of approval of men who have known you and worked with you and at one time employed you.

The CHAIRMAN. I think that is a very fine tribute, and I am delighted to hear it, Senator.

With the appointment of Dr. Glennan, the Commission comes up to full strength, and I think we will be in excellent shape as far as the Commission is concerned, and I am quite happy about it.

Dr. GLENNAN. Thank you, sir.

I should tell you, Senator McMahon, that I will find it difficult if not impossible to come to Washington until October 1, until I get this school launched on another school year and wind up some of my family affairs in Cleveland. I intend to be here October 1, if confirmed.

The CHAIRMAN. If we confirm you, as I assume the Senate will, you will have an opportunity in the interim, I assume, to make some trips in here and take home some work, in which you can familiarize yourself with this work.

Dr. GLENNAN. I suspect the midnight oil will be burned.

The CHAIRMAN. If there are no further questions, Doctor, thank you very much, indeed. We will be reporting the nomination to the Senate.

Senator KNOWLAND. There is just one question that I would like to ask.

I subscribe to what the Senator has said. All of the reports I have had are of the very high standing of the doctor.

On this work that your were doing from 1942 to 1945, with the United States Navy Underwater Sound Laboratory at Columbia, just as a matter of information, did that job require the handling of classified information?

Dr. GLENNAN. Very much so; yes, sir.

Senator KNOWLAND. Thank you.

The CHAIRMAN. Thank you, Doctor.

(Thereupon, at 10:45, the hearing was adjourned.)

Senator JOHNSON. In the military construction appropriation bill, 1959, we have an appropriation for aviation medicine.

The committee states:

> The committee is convinced that it is imperative that we move forward quickly in the construction of adequate laboratories and facilities for studies in the field of space medicine.

That is in the report filed in the Senate.

It is true it has been authorized and the appropriations have been made.

The committee's report further states:

> Further, it is only logical to assume that such facilities must be in place and in operation and producing proven data long before we can expect to project man into space with some expectation of survival. The problems of living outside the earth's atmosphere are complex, and so far research has been limited. This Nation cannot afford to depend on limited research. Our scientists and technicians must be given the tools to develop the necessary knowledge of the effects of outer space upon the human body.

I should like to have any observations, Dr. Dryden, that you care to make.

First, are you familiar with the experiments that have been made?

Dr. DRYDEN. Yes, I am.

Senator JOHNSON. Do you agree technically with the general statement of the committee?

Dr. DRYDEN. The general statement in the long run is correct. I believe that there is enough information from the research in this field that is being done, and in this I am supported by authorities that we can put a man in space for periods of 2 or 3 days without waiting for the new facilities; but if we are going to put a man in space for an extended period, there is a tremendous amount of research that has to be done.

Senator JOHNSON. Are you reasonably pleased with the results of the research that has been done?

And from a comparative standpoint, in our Nation, you think, do you, that our efforts are reasonably good?

Dr. DRYDEN. You are talking now in the space-medicine field?

Yes, we are, I think, ahead in the space medicine field.

Such consideration as the NACA has given in connection with the planning for the new agency has led to this conclusion. It has not been an extensive survey. There is good work being done at the School of Aviation Medicine at the installation in the Navy, to a much more limited extent in private institutions. It does not make sense for the new agency to try to start a centralized space-medicine laboratory in space medicine at the moment.

Senator JOHNSON. But you are going to do everything you can to encourage what has been started and to accelerate it?

Dr. DRYDEN. We propose to support projects within these military agencies and at the universities in space medicine, but not to try to pull together a new central laboratory.

Dr. Glennan will have to review this at a later date.

That is the status of the preliminary work.

Senator JOHNSON. We go off and on again, Doctor, on this.

You start, and we authorize it, and we pull back and start again, and then we pull back.

My general impression is that in the field of space medicine, achievements have been good. And it is obvious now we should expedite and accelerate it as much as we can. And the Congress is doing everything it can toward that end.

We have authorized and appropriated for it. It is just one small segment. It is a beginning, but we must go ahead.

Do you share that view?

Dr. DRYDEN. Yes. This is a highly competent group at the School of Aviation Medicine. I am not familiar with their request, but I would suggest that I would support it.

Senator JOHNSON. I was not reading from their request. I was reading from the observations of the committee, and I wanted to be sure that you did share that view.

Senator ANDERSON. I think we have had a good deal of work done at Alamogordo.

Dr. DRYDEN. That is one of the good facilities. There are about 5 or 6.

Senator JOHNSON. Are there any other questions? Any questions by any members of the committee?

Senator Lausche, we have placed in the record your observations and your recommendations in the matter. We would be very happy to have you join us up here to ask any questions you care to.

Senator LAUSCHE. I merely wanted to give testimony concerning my views that the nomination ought to be confirmed by the Senate.

Senator JOHNSON. We have that in the record and we will be glad to have any statement you care to make.

Senator LAUSCHE. Dr. Glennan has been connected with the Case Institute of Technology, I believe, since 1947.

My contact with him since 1947 has been personally intermittent, but through the press and through other means of communication, rather intimate.

I have no hesitancy in testifying to his vast fitness to fill the important task that has been suggested for him by the President.

By reputation and character, I believe that it must be said that he is an excellent person. His devotion to his country is unimpeachable. His administrative ability at Case Institute of Technology has won for him the respect of every civic leader and person in this development not only of Cleveland and the State of Ohio but the country.

I would have great comfort and satisfaction in the knowledge that he was at the head of this very important public duty that our country has for him to perform.

That is all, Mr. Chairman.

Senator JOHNSON. We will be glad for you to remain, if you care to. The committee will go into executive session.

(Thereupon, at 11:35 a. m., the committee went into executive session.)

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